Five-Year Review Report

Second Five-Year Review Report
for
Brio Refining Superfund Site
Harris County, Texas

May 2003

PREPARED BY:

United States Environmental Protection Agency
Region 6
Dallas, Texas

Approved by:

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Director
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U.S. EPA, Region 6

Date: 5/13/03

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List of Acronyms

BSTF	Brio Site Task Force
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
ESD	Explanation of Significant Difference
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NSCZ	Numerous Sand Channel Zone
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TCEQ	Texas Commission on Environmental Quality
VOC	Volatile Organic Compound

Executive Summary

The remedy for the Brio Refining site in Harris County, Texas, is a containment alternative that includes a vertical barrier wall, cap, and groundwater controls. The site is currently under construction. The trigger for this review was the completion of the first five-year review in January 1998.

The assessment of this five-year review found that the remedy is being constructed in accordance with the requirements of the Record of Decision. The remedy is expected to be protective of human health and the environment upon completion of the remedial action. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to contaminated soils or groundwater.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Brio Refining Superfund Site		
EPA ID *(from WasteLAN)*: TXD980625453		
Region: 6	**State:** TX	**City/County:** Harris County

SITE STATUS	
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)	
Remediation status (choose all that apply): ☒ Under Construction ☐ Operating Complete	
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** _ / _ /
Has site been put into reuse? ☐ YES ☒ NO	

REVIEW STATUS	
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency	
Author name: John Meyer	
Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA, Region 6
Review period:** 12 / 1 / 2002 to 5 / 1 / 2003	
Date(s) of site inspection: 3 / 26 / 2003	
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion)	
Review number: ☐1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify)	
Triggering action: ☐ Actual RA On-site Construction at OU #__ ☐ Actual RA Start at OU# NA ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)	
Triggering action date *(from WasteLAN)*: 1 /8 / 1998	
Due date *(five years after triggering action date)*: 1_ / 8 / 2003	

Five-Year Review Summary Form, cont'd.

Issues:

The state water quality standard for three of the contaminants of concern at the site has been changed since the Amended Record of Decision.

Recommendations and Follow-up Actions:

An analysis of the surface water data collected over the last three years shows that the surface water is currently and consistently meeting the revised standard. Therefore, it is not necessary to consider at this time whether a revision of the performance standards for surface water is warranted in the Amended Record of Decision in order to be protective.

Protectiveness Statement(s):

The remedy is expected to be protective of human health and the environment upon completion of the remedial action. In the interim, exposure pathways that could result in unacceptable risks are being controlled are preventing exposure to contaminated soils or groundwater.

Long-term Protectiveness:

Long-term protectiveness of the remedial action will be verified by obtaining surface water samples and monitoring the effectiveness of the site controls.

Other Comments:

The amended ROD requires that site control be maintained through the use of fencing and the imposition of deed notices or restrictions (if possible). The Brio Site Task Force currently controls the site, and a fence has been maintained around the perimeter of the site. The expected long term maintenance and operations at the site will involve a continual site presence. The BSTF does not own the property, and therefore can not place deed notices or restrictions on the property.

The absence of deed notices or restrictions at this time does not call into question the current protectiveness of the remedy, but the implementation of these measures should be pursued to assure future protectiveness.

Brio Refining Superfund Site
Houston, Texas
Second Five-Year Review Report

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA), Region 6, conducted the five-year review of the remedy implemented at the Brio Refining Superfund Site in Houston, Texas. This review was conducted by the Remedial Project Manager (RPM) for the site from December 2002 through May 2003. This report documents the results of the review.

This is the second five-year review for the Brio Site. The triggering action for this statutory review is the completion of the first five-year review on January 8, 1998. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1 - Chronology of Site Events

Event	Date
Chemical reprocessing and refining activities at the site	1950's - 1982
Removal activities – placement of pit cover	1985
Final listing on EPA National Priorities List	3/1989
Remedial Investigation/Feasibility Study (RI/FS) complete	3/1988
ROD selecting the remedy is signed	3/31/1988
Consent Decree finalizing settlement for responsible party performance of remedy entered by Federal Court	4/04/1991
Start of on-site construction for building/structures demolition and decontamination (1st phase of site Remedial Action and date that triggers a five-year review).	6/29/1989
ROD Amendment issued by EPA, changing from on-site incineration to containment.	7/2/1997
Consent Decree amended to include modified remedy	3/5/1999
Start of on-site construction for modified remedy	7/11/2000

III. Background

The Brio Site is located almost 20 miles south of Houston, Texas, and occupies approximately 58 acres. The site is divided by Dixie Farm Road, with Brio North being historically used for storage purposes and Brio South being primarily used for processing activities. A neighboring residential subdivision (Southbend, now abandoned) is located along and north of the northern boundary of Brio North. Mud Gully, a flood control ditch and local tributary of Clear Creek, runs along the western boundary of the Brio site. Attachment 1 shows the general location of the Brio site and the site layout.

In general, processing activities consisted of reclamation of petrochemicals from various source materials, most of which were residues, tank bottoms, and tars of other processes performed at off-site locations. Most of the feedstock materials for processing at Brio were stored in on-site pits, many of which were located on Brio North. However, the disposal areas were on both the Brio North and South Sites. All of the pits were closed during site operations which ceased in December 1982. EPA finalized the site on the National Priorities List on March 31, 1989.

Numerous investigations, studies, and site activities have been performed at the Brio Site in efforts to determine the location of the former storage pits and the nature and extent of contamination. The investigations found that the majority of the contamination at the site is found within the location of the former storage pit areas. The pits were constructed within the uppermost geologic unit designated the Upper Clay. This unit occurs across the entire site and ranges in depth from 14 to 32 feet.

Following the site investigations, EPA issued a Record of Decision on March 31, 1988, that selected on-site incineration of pit residuals, removal of surface contamination, channel improvements to Mud Gully, demobilization of remaining process equipment and removal of debris on the site, removal of dense non-aqueous phase liquids (DNAPL) and pump and treat for groundwater in the numerous sand channel zone (NSCZ). The ROD addressed all the threats at the site as a single operable unit, including groundwater contamination. A consent decree was entered in April 1991 between EPA and the Brio Site Task Force (BSTF) for implementation of the ROD.

A remedial design was performed by the BSTF and approved by EPA in July 1993. Demolition of the majority of the remaining process equipment was completed prior to mobilization of the incinerator.

A rotary kiln incinerator and support equipment were mobilized to the site following the demolition work. Temporary enclosures were erected over the pits requiring remediation in order to contain emissions during excavation. The incinerator began clean burn operations with imported material and excavation began at Pit R on Brio South for shakedown operations and to stockpile material for the trial burn. Emission problems during excavation led to a "stop work" order until appropriate emission control equipment could be installed. Before additional controls could be installed, other events described below led to the submittal of a force majeure claim by the BSTF, which eventually resulted in the decision by EPA to allow the dismantling of the incinerator. The incinerator and support equipment were demobilized by December 1994.

Basis for Taking Action

The three primary affected media at the site include groundwater, surface soils, and subsurface soils. The extent of affected soils and groundwater have been defined through previous investigations and studies. The principle contaminants of concern at the site are organic compounds and chlorinated solvent compounds. Some of the notable contaminants include the following:

1,1,2-Trichloroethane	1,2-Dichloroethane
1,2-Dichloroethene	1,1-Dichloroethene
1,1-Dichloroethane	Vinyl Chloride
bis-(2-chloroethyl) ether	Phenanthrene

An Endangerment Assessment (EA) was performed shortly after the RI was completed. The EA estimated the potential for adverse effects on human health and the environment from exposure to contaminants at the site. The actual contaminant concentrations found on the site were compared to the exposure from a concentration known to have an adverse impact. From the EA, it was determined that the site potentially posed four major risks to human health and the environment. The pathways are:

- Direct (dermal) contact and ingestion of contaminated surface soils and sediments on the site.
- Inhalation of contaminated dust and volatile organic compound (VOC) emissions from the site.
- Ingestion of contaminated groundwater from the fifty-foot sand zone (FFS) beneath the site.
- Exposure of aquatic biota to NSCZ discharges of contaminated groundwater to Mud Gully.

IV. Remedial Actions

Remedy Selection

The original Record of Decision in 1988 included the following major elements in order to address this objective:

Affected materials and soils - Affected materials and soils shall be treated using either incineration or biological treatment. This media is defined as all contaminated sludges and liquids and waste material found to exist above the action levels defined in the Endangerment Assessment. This media is largely found in the on site pits

Storage tanks, drums and process equipment - Remove tank contents, decontaminate tanks, and transport the tanks to an EPA approved off-site disposal facility.

Monitoring and control of migration pathways - Control exposure pathways through ambient air, surface water, and groundwater. Specifically, the ambient air should be monitored on a semi-annual basis and emissions should be controlled from treatment processes. Discharges to Mud Gully should be controlled and monitored. Groundwater pathways in the Numerous Sand Channel Zone (NSCZ) and the Fifty-Foot Sand Zone (FFSZ) should be monitored and action taken if the action levels are exceeded.

Summary of Work Performed during First Five Year Review

In June 1989, an Administrative Order on Consent was signed with a group of companies, referred to as the Brio Site Task Force (BSTF), to begin dismantlement of the process equipment on the site. The facility dismantlement was completed in December 1989. Material present in the process equipment and tanks was consolidated into remaining tanks. Approximately 30 tanks were

left on the site that could potentially be used in the implementation of the bioremediation remedy. The process equipment and tanks were decontaminated and sent to an off-site smelter for reclamation.

A consent decree with a scope of work to implement the remainder of the ROD was entered by the federal district court on April 4, 1991. The BSTF began implementation of a remedial design (RD) to address the scope of work. The BSTF chose to implement the incineration alternative in the ROD due to lack of competitive bids for the biological alternative.

A remedial design was completed in July, 1993, that addressed installation and operation of an incinerator to treat contaminated soils, sludges, and liquids above the action levels specified in the ROD. In addition, the RD addressed installation of a barrier well system to control groundwater migration in the NSCZ.

In May 1993, surface water discharges were found to be occurring in Mud Gully. Characterization of the water and sediments in Mud Gully and Clear Creek found that chlorinated volatile organics were discharging from the Brio site into the streams. A groundwater barrier system was installed on the Brio site in the area of Pit B in order to control the discharges of contaminated groundwater to Mud Gully. The surface water in Mud Gully and Clear Creek are sampled periodically to ensure compliance with the standards evaluated in the ROD. Over 12 million gallons of groundwater have been extracted and treated since the system began operating in late 1993. In addition, the barrier system has removed approximately 30,000 gallons of dense non-aqueous phase liquid (DNAPL) from the NSCZ which was sent for off-site disposal.

In December 1993, site preparation work for the mobilization of the incinerator began. This work included removal of the majority of the remaining tanks from the initial dismantling operation. The tanks were cleaned and sent off-site for smelting. Residual materials from the tanks were consolidated into Tank 402, the sole remaining tank on Brio South, or placed into roll-off boxes for subsequent treatment.

A rotary kiln incinerator and support equipment were mobilized to the site following the demolition work. Temporary enclosures were erected over the pits requiring remediation in order to contain emissions during excavation. The incinerator began clean burn operations with imported material and excavation began at Pit R on Brio South for shakedown operations and to stockpile material for the trial burn. Emission problems during excavation led to a “stop work” order until appropriate emission control equipment could be installed. Before additional controls could be installed a force majeure claim was submitted by the BSTF, which eventually resulted in the decision by EPA to allow the dismantling of the incinerator. The incinerator and support equipment were demobilized by December 1994. Since demobilization, the groundwater treatment system has continued to operate, the DNAPL remediation has proceeded, and drums stockpiled since the inception of investigations, roll-off boxes containing affected material, and the contents of Tank 402 were sent off-site for disposal.

Amended Record of Decision

A focused feasibility study was initiated to evaluate alternatives to the incineration remedy selected in 1988. An Amended Record of Decision was signed by EPA on July 2, 1997. The remedial action objectives developed for site response actions include:

- Protection of the health and safety of the community, workers, and the environment during implementation of the remedy;

- Minimization, to the extent practicable, of disruption and inconvenience to the community during implementation of the remedy;

- Long-term, effective control of migration of leachable organic liquids from the source area;

- Long-term, effective control of off-site migration of free-phase liquids or site constituents moving through the groundwater, surface water, soil, or air pathways;

- Long-term, effective reduction of potential future risk to the community and the environment resulting from off-site exposure to site constituents by maintaining or achieving:

    - Target levels of public exposure to air emissions,
    - Target levels of affected soil dermal contact and ingestion,
    - Control of off-site transport of affected soils to acceptable levels,
    - Protection of existing aquatic life in Mud Gully, and
    - Target levels of organic constituents in the Fifty-Foot Sand Zone within a reasonable time.

- Minimization of potential negative impact of natural disasters such as flooding, hurricanes, etc.; and

- Long-term, effective site control and aesthetics.

The Amended ROD selected containment as the preferred alternative. The elements of the containment remedy include:

Vertical Barrier Wall - A sub-grade barrier wall will be constructed to limit the potential for off-site migration of contaminated groundwater in the NSCZ. The wall will be designed to encompass the site and will be keyed to the Middle Clay Unit. The technique of construction will be established in the remedial design.

Site Cover - A composite cap will be constructed over the site, extending to the limits of the barrier wall. The cap will include a gas collection layer, a flexible membrane liner, compacted clay, and top soil to promote vegetative growth.

Groundwater Flow Control - A groundwater pumping system will be installed within the barrier wall to limit the migration of site contaminants. Recovered groundwater will be treated and discharged to Mud Gully.

Air Monitoring and Long Term Groundwater Monitoring - An air monitoring system will be maintained during the construction of the remedy to protect public health. The groundwater will be monitored in the FFSZ to ensure groundwater is below established Maximum Contaminant Levels (MCLs). The NSCZ groundwater outside the barrier wall will be monitored to demonstrate compliance with water quality criteria for Mud Gully.

Mud Gully - Similar to the original proposal, this option includes channel improvements to the gully, but also allows the option of relocation of the gully by Harris County.

Common Components - In addition, containment retains several components unmodified from the original remedy, which include addressing the following:

- Off-site soil contamination
- Debris and rubble
- Wastewater treatment system
- Storage tanks and drums
- Process equipment
- Site control

V. Progress Since the Last Five-Year Review

Construction of the remedial action pursuant to the Amended ROD began in July 2000 and has been implemented in phases. The primary components of the construction are:

- Soil bentonite barrier wall
- Sheet pile barrier wall
- Cover system
- Mud Gully improvements
- Groundwater control systems

Soil Bentonite Barrier Wall

Approximately 5900 lineal feet of slurry wall was constructed around the perimeter of the site from September to December 2000. The slurry wall was constructed by excavating a 30-inch wide trench to a depth that seals the wall into a low-permeable natural clay layer termed "Middle Clay Unit" (MCU). The depth of the slurry wall ranged from approximately 35 to 50 feet. The stability of the excavation was maintained using a drilling mud fluid (slurry) that was prepared onsite. Once the excavation achieved the proper depth, a backfill material (consisting of thoroughly mixed native soils and fresh slurry) was placed in the excavation. Once installed, the backfill

material became the barrier wall and was tested to confirm that the constructed barrier wall achieved the required permeability.

EPA provided oversight of the construction. An interim completion report was issued by the Brio Site Task Force to provide the construction quality assurance documentation. This report will be incorporated by reference into the final completion report when construction is complete.

Sheet Pile Barrier Wall

The sheet pile barrier wall was installed from July 2001 to December 2001. The wall is approximately 1,781 feet long and varies in depth from 35 to 50 feet below ground surface. The wall was installed to designed depths into the low-permeable natural clay layer. The sheet pile wall is composed of two sections:

- The main alignment is approximately 1,188 linear feet and was installed on the Brio Site.

- The cofferdam alignment is approximately 593 linear feet. The cofferdam was installed within the Mud Gully easement to contain an off-site groundwater plume.

EPA provided oversight of the construction. An interim completion report was issued by the Brio Site Task Force that provided the construction quality assurance documentation. This report will be incorporated by reference into the final completion report when construction is complete.

Cover System (Brio South)

The construction of the cover system was divided into two components: Brio-North and Brio-South. The two areas are divided by Dixie Farm Road and separate borrow pit areas were developed in order to minimize truck traffic over the road, The Brio South cover was initiated first due to its smaller size. The Brio-South cover system was constructed from May 2001 to February 2002. An additional compacted clay layer was extended over a segment of Dixie Oil Processors (DOP) South to provide controlled surface water runoff.

The Brio-South cover system components are as follows:

- Bedding Layer (varies in thickness)
- Gas Collection Layer, and a Flexible Geomembrane Liner (FML),
- Compacted Clay Layer (eighteen inches), and
- Vegetative cover

The area of the Brio-South cover system is approximately 11.7 acres, and was constructed to the limits of the of the soil-bentonite barrier wall on the east and south sides, to Dixie Farm Road Right-of-Way on the north side, and to DOP-South on the west side.

The DOP-South cover system components consists of a compacted clay layer that varies in thickness, and a vegetative cover. The area of the DOP-South compacted clay cover is approximately 3.8 acres. The compacted clay cover was constructed to the limits of the soil bentonite barrier wall on the south and west sides, and was tied-in with the Brio-South compacted clay layer on the east side, and to the Right-of-Way of Dixie Farm Road on the north side. The vegetative cover was also installed over the DOP-South.

EPA provided oversight of the construction. An interim completion report was issued by the Brio Site Task Force that provided the construction quality assurance documentation. This report will be incorporated by reference into the final completion report when construction is complete.

Areas of Noncompliance

No areas of noncompliance have been identified at this stage of remedial activity. Once implemented, the selected remedy is expected to address the remedial action objectives.

System Operation/Operation and Maintenance

An operations and maintenance plan will be developed by the Brio Site Task Force prior to construction completion. At this time, the site is still under active construction.

VI. Five-Year Review Process

Administrative Components

The Brio Site Task Force and the Texas Commission of Environmental Quality (TCEQ) were notified of the initiation of the five-year review on December 5, 2002. The Brio Five-Year Review team was led by John Meyer of EPA, Remedial Project Manager (RPM) for the Brio Site, and Faye Duke of the TCEQ assisted in the review as the representative for the support agency.

Community Involvement

A notice was sent to local newspapers on February 5, 2003, stating that a five-year review was to be conducted for both the Dixie Oil Processors site and the Brio Refining site. On December 5, 2002, the EPA project manager notified the local emergency responders that the five-year review process was going to start and solicited their input on the process.

Document Review

This five-year review consisted of a review of relevant documents including the interim

construction reports, the 1997 Amended Record of Decision, the Statement of Work, and groundwater and surface water data generated since the remedial investigation. (See Attachment 2)

Data Review

The data review focused on an evaluation of the current groundwater, surface water, and air monitoring data. A meeting was held at the site with the EPA project manager and the oversight team to review these reports.

The team reviewed the latest reports on the groundwater and surface water data contained in the latest annual and semi-annual reports submitted by the Brio Site Task Force. The sampling is conducted as part of the Remedial Operations Plan.

The groundwater data showed that the fifty-foot sand is probably meeting the performance standard in the ROD. An issue of whether the analytical method being used is the appropriate method was discussed because the detection limit of 10 ppb is above the Maximum Contaminate Level (MCL) for vinyl chloride (MCL 2 ppb), 112 TCA (MCL 5 ppb), or 12 DCA (MCL 5 ppb). The language in the statement of work to the Consent Decree allows for a higher performance standard if EPA standard methods do not achieve the MCL.

The review of the surface water data concluded that the performance standards for Mud Gully and Clear Creek are currently being met, and in fact, had not been exceeded for many years. The team concluded that the sheet pile wall and soil-bentonite wall are performing as designed.

A review of the air data generated by the fence line air monitoring network shows no exceedances of the action levels established for the project. The air monitoring system was discontinued on April 4, 2003, following the complete installation of the flexible membrane liner over the site.

Site Inspection

A site visit was conducted by the EPA RPM on March 26, 2003, to verify the status of the remediation. Photo documentation of the visit is included in this report (See Attachment 3-4). A rigorous site inspection was not conducted for the specific purposes of this five-year review due to the on-going construction at the site. Monthly progress meetings are held during construction with the oversight team and the Brio Site Task Force. EPA provides oversight of the construction on a frequent basis and any inspection issues are dealt with immediately by the BSTF or discussed at the monthly meetings.

The following is a discussion of the status of the remaining construction items that have not been completed as discussed in Section V. This status is based on the monthly meeting held on March 27, 2003. It is likely that additional progress has been made subsequently.

Mud Gully

This portion of the project is 99% complete. The work began in Mud Gully in June 2002 and involves shaping and lining the gully with 135,000 ft^2 of articulated concrete block. Minor shaping work remains. The team had no concerns with the construction.

North Cover

The north cover work began in November 2001 and includes the installation of a bedding layer, geocomposite, flexible membrane liner and cover for approximately 80 acres. The north cover is approximately 70% complete. The team had no outstanding issues with the quality of the work. Upon final construction, the cover is expected to perform as designed.

Water Treatment Plant

The treatment plant has been fully constructed and is waiting on installation of piping from the recovery wells. The plant has not gone through start-up procedures.

Overall, the team noted that the remedy was already performing as expected, even though the construction is not complete. The installation of the sheet pile wall and slurry wall have had a positive effect of lowering the discharge of contaminated water to Mud Gully as evidenced by the monthly surface water samples. The cover system is maintaining emissions levels below the action levels.

Interviews

Interviews were conducted with key citizens who have had long-term association with the site. Mrs. Marie Flickenger is an area resident, the publisher of the local newspaper and sits on the Board of Regents for the nearby community college. Mr. Dan Martin is the administrator of the adjacent hospital. The EPA RPM interviewed both parties on March 26, 2003. No significant problems regarding the site were identified during the interviews.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, sampling results, ARARs, risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the amended ROD. Even though the construction of the remedy is not complete, the installation of key components of the remedy has had a positive effect of minimizing groundwater discharges and air emissions.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action

objectives (RAOs) used at the time of the remedy selection still valid?

Since the development of the exposure assumptions, the area surrounding the Brio site has changed dramatically. At the time of the RI, the Southbend Subdivision was located immediately adjacent to the north portion of the site. The subdivision has since been abandoned and demolished, substantially reducing the potential receptors. The cleanup levels used to establish the extent of the remedy are still valid, however, since they were based predominantly on a trespasser scenario.

Changes in Standards and To Be Considereds

Since the issuance of the 1997 ROD Amendment, the Texas water quality standards for three of the chemicals have been revised under 30 TAC §307. Specifically, the standard for 1,2-dichlorethane changed from 1794 µg/L to 73.94 µg/L, the 1,1 dichlorethylene standard changed from 89.4 µg/L to 5.84 µg/L and the vinyl chloride standard increased from 94.5 µg/L to 415 µg/L. These numbers would apply to Clear Creek (Table 1). Additionally, for water bodies that are considered incidental fishery (i.e., Mud Gully), the numerical criteria shall be ten (10) times the criteria listed (for water considered to have a substantial fishery).

In accordance with the Clean Water Act Section 303(d), the tidal and above-tidal segments of Clear Creek were included in the 1998 and 1999 303(d) list. Consequently, the TCEQ developed total maximum daily loads for these segments of the water bodies for 1,2 dichlorethane and 1,1,2 trichlorethane. Because the sole source of the VOC contamination was attributed to Brio, all allowable loading is also allocated to the site, and consequently, the concentration end points developed through the TMDL for 1, 2 dichlorethane is the same value as those listed under 30 TAC §307.

Since 1993, sampling has been conducted in Mud Gully and Clear Creek to measure the effectiveness of the interim groundwater recovery system, and more recently, the effectiveness of the barrier wall. A review of the surface water data since 1999 shows that the controls implemented for the groundwater have reduced the loading to the surface water to below the ARARs established in the amended ROD and below the revised Texas water quality standards. Because the remedy is currently achieving the new standards, there is no concern about the protectiveness of the remedy. The revised water quality standard will be considered in the future monitoring program implemented as part of the operations and maintenance.

Table 2 - Clear Creek Criteria

Chemical	*1997 ROD**	*Changed standard*	*Highest Measured value in Clear Creek since 1999*	*Detected frequency in Clear Creek since*

				1999
1,2 dichloroethane	1794	73.94	5J	14/52
1,1 dichloroethylene	89.4	5.84	5J	3/52
1.1.2 trichloroethane	41.8	420	7	35/52
Vinyl chloride	94.5	415	3J	5/52

*All units in µg/L

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The amended ROD requires that site control be maintained through the use of fencing and the imposition of deed notices or restrictions (if possible). The Brio Site Task Force currently controls the site and a fence has been maintained around the perimeter of the site. The expected long term maintenance and operations at the site will involve a continual site presence. The BSTF does not own the property, and therefore cannot place deed notices or restrictions on the property.

The absence of deed controls at this time does not call into question the current protectiveness of the remedy, but the implementation of these measures should be pursued to assure future protectiveness.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the amended ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

VIII. Issues

Table 3 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Change in surface water standard.	N	N
Implementation of deed restrictions.	N	Y

IX. Recommendations and Follow-Up Actions

Table 4 - Recommendations and Follow-Up Actions

Issue	Recommendations / Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Change in surface water standard	Design future monitoring to allow for future determination of protectiveness. Standard is not adopted as an ARAR at this time.	BSTF	EPA	12/30/2003	N	N
Implementation of deed restrictions	Evaluate the ability to implement restrictions through current landowners.	BSTF, EPA		12/30/2004	N	Y

- Protectiveness Statement

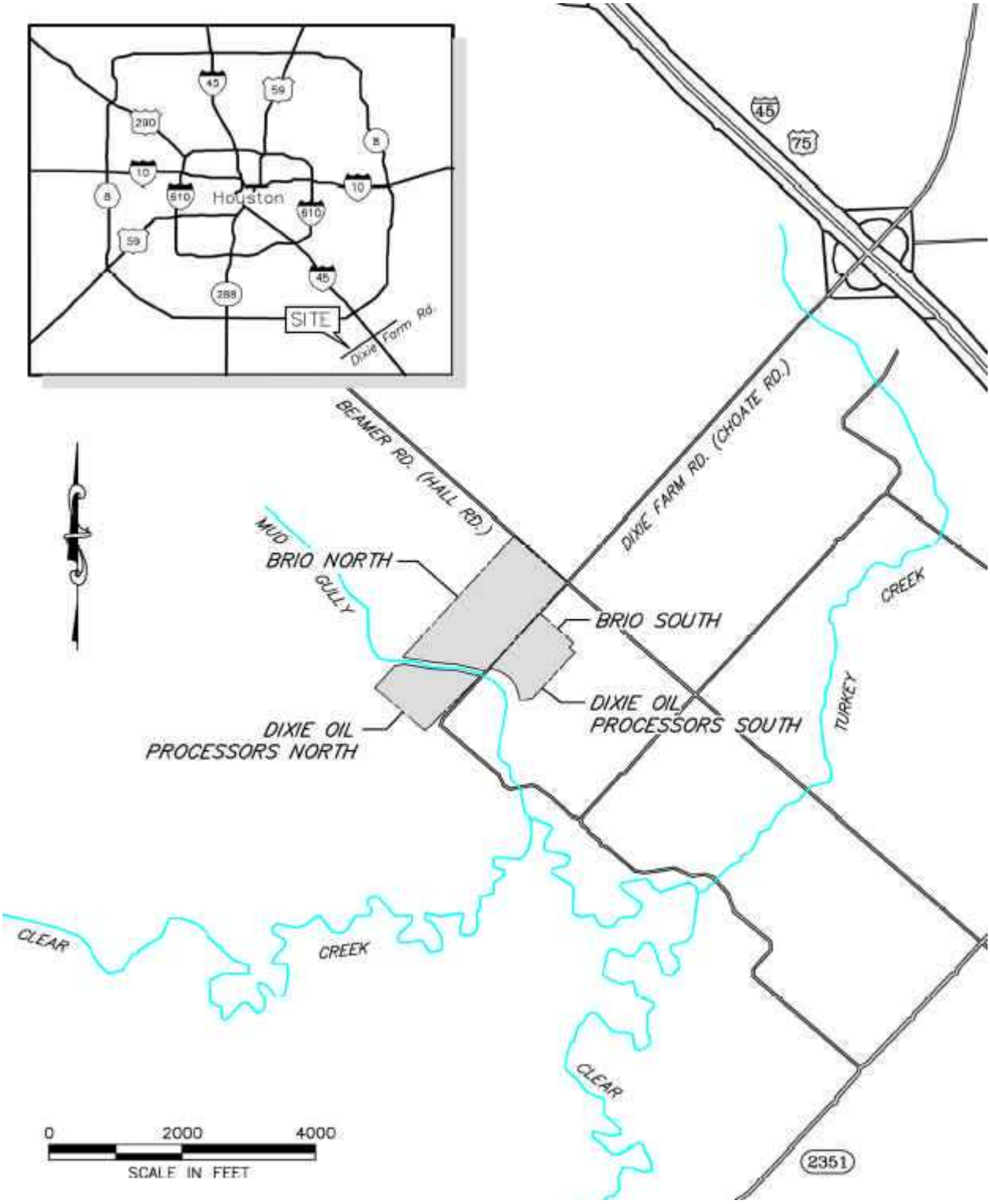
The remedy is expected to be protective of human health and the environment upon completion of the remedial action. In the interim, exposure pathways that could result in unacceptable risks are being controlled and are preventing exposure to contaminated soils or groundwater.

Long-term protectiveness of the remedial action will be verified by obtaining surface water samples and monitoring the effectiveness of the site controls.

- Next Review

The next five-year review for the Brio Refining Superfund Site is required by May 2008, five years from the date of this review.

ATTACHMENTS



Attachment 1

ATTACHMENT 2

List of Documents Reviewed

Brio Refining Site Amended Record of Decision, July 2, 1997

Brio Refining Site Settlement Agreement, March 5, 1999

Brio Refining Site Fourth Quarter – 2002 Status Report, Mud Gully Response , January 7, 2003

Brio Refining Site 2002 Annual Groundwater Monitoring Report, November 4, 2002

Brio Refining Site Five Year Review, January 8, 1998

Mud Gully reconstruction

Water Treatment Plant

Attachment 3 – Site Inspection

Construction on North Cover

Construction on North Cover

ATTACHMENT 5

Applicable or Relevant and Appropriate Requirements (ARARs)

Medium/ Authority	ARAR	Status	Requirement Synopsis	Action to be taken to Attain ARAR
Groundwater/ SDWA	Federal - SDWA - Maximum Contaminant Levels (MCLs) (40 CFR Part 141.11-141.16)	Relevant and Appropriate	Standards (MCLs) have been adopted as enforceable standards for public drinking water systems. MCLs are applied to the fifty-foot sand zone at the Brio site.	Groundwater monitoring will take place in the fifty-foot sand to ensure that contaminants are not migrating down from the upper zones. If MCLs are exceeded, then corrective action may be required.
Surface Water/State	Texas Surface Water Quality Standards , TAC §307	Applicable	Water quality standards are developed to be protective of incidental fishery.	Containment of the contaminated groundwater within the barrier wall to eliminate the release to surface water.
Air/State	Standard Exemption 68 and 118, codified into 30 TAC §106.533 and 30 TAC §106.261	Applicable	Set allowable limits for air discharges from treatment units.	Water treatment facility designed to comply with standards.

Attachment 6

INTERVIEW RECORD

Site Name: Dixie Oil Processors/Brio Refining		**EPA ID No.:** TXD089793046 TXD980625453
Subject: Five Year Review	**Time:** 8:00 a	**Date:** 3/25/03
Type: 9 Telephone **X** Visit 9 Other **Location of Visit:** Memorial Herman Hospital		9 Incoming 9 Outgoing

Contact Made By:

Name: John Meyer	**Title: RPM**	**Organization: EPA**

Individual Contacted:

Name: Dan Martin	**Title: Administrator**	**Organization: Memorial Herman Hospital Southeast**
Telephone No: **Fax No:** **E-Mail Address:**	**Street Address: Beamer Road** **City, State, Zip:Houston, TX 77089**	

Summary Of Conversation

Meeting started by outlining the reason for the visit and the purpose of the 5 year review. Mr. Martin was not aware of the requirement for continuing reviews after the site was finished.

Mr. Martin has been involved with the Brio and DOP site for approximately 9 years. He is a member of the CAG group that was assembled to revise the original remedy for the Brio site.

Mr. Martin noted that employee concerns with the sites has dropped off dramatically over the last few years. The hospital is currently undergoing a $7.5 million expansion. The hospital is located within 1/4 mile of the site.

Following a discussion of the long term uses of the sites, Mr. Martin said that the hospital is not concerned with the proposed aesthetics of the Brio site or the current conditions of the DOP site. He was not concerned with site security. He is aware that the sites are restricted for future uses an did not see any problems.

INTERVIEW RECORD

Site Name: Dixie Oil Processors/Brio Refining	**EPA ID No.:** TXD089793046 TXD980625453
Subject: Five Year Review	**Time:** 8:00 a **Date:** 12/04/02
Type: 9 Telephone 9 Visit 9 Other **Location of Visit:** Site office trailer	9 Incoming 9 Outgoing

Contact Made By:

Name: John Meyer	**Title: RPM**	**Organization: EPA**

Individual Contacted:

Name: Marie Flickenger	**Title: Publisher Board of Regents**	**Organization: South Belt Leader newspaper, San Jacinto Community College**
Telephone No: 281-481-5656 Fax No: E-Mail Address:	**Street Address: City, State, Zip:**	

Summary Of Conversation

Dixie Oil Processors

Mrs. Flickenger is concerned about the fact that the majority of the materials remained on the DOP site. We discussed the remedy that was implemented at DOP, specifically the site cover system and noted similarities to the Brio site. It was also noted that the soil bentonite barrier wall implemented as part of the Brio remedy, surrounds the majority of the DOP south side.

Marie is concerned that development will encroach onto the DOP site. EPA noted that the site is restricted for future uses, but that the deed restriction were not currently in place. This was a high concern for Mrs. Flickenger. She is not concerned about the current status of the site, or its protectiveness, she is mainly concerned about future generations forgetting what was there.

Brio

Mrs. Flickenger would like to see the HCFCD utilize the new retention basins built as part of the construction for Brio, and expand them to provide additional flood protection. She does not have a concern with how the basins were built as part of the remedy.

She is concerned with follow up air monitoring after the construction is complete.

She is very satisfied with the communication on the status of the construction. She noted that the CAG group did not utilize the last 50K grant because they are comfortable with the remedy and EPA's oversight.

Mrs. Flickenger is contacted by numerous concerned citizens and prospective home buyers because of her position at the newspaper and the college and her long-term involvement with the site. She noted that she tells them that her biggest concern with the site is air emissions and tha the air monitoring system currently in use provides a reliable basis to show that emissions are not a problem. She also says the remedy will address future emissions, but hte site should have some periodic monitoring to verify.

Attachment 7

MEETING RECORD

Site Name: Brio Refining	**EPA ID No.:** TXD980625453

Subject: Five Year Review site inspection	**Time:** 8:00 a	**Date:** 3/27/03

Type: 9 Telephone 9 Visit 9 Other **Location of Visit:** Site office trailer	9 Incoming 9 Outgoing

Contact Made By:

Name: John Meyer	**Title: RPM**	**Organization: EPA**

Individual Contacted:

Name: See below	**Title:**	**Organization:**

Telephone No: **Fax No:** **E-Mail Address:**	**Street Address:** **City, State, Zip:**

Summary Of Conversation

Attendees: John Meyer, EPA; Dan MacLemore, Weston Solutions; Jack Otis, COE; Larry Hill, COE

A meeting was held with the oversight team to discuss the status of the remediation at the Brio site and discuss any concerns or on-going issues. This meeting was held in lieu a site inspection, because the oversight team conducts site inspections regularly. Status photo were taken on 3/26/03 and are incorporated.

Mud Gully

This portion of the project is 99% complete. The Mud Gully work began in June 2002 and involves shaping the gully and placing 135,000 ft^2 of articulated concrete block. Minor dirt work remains before this portion of the work is complete. The team had no other concerns.

North Cover

The north cover work began November 2001 and involves installation of a bedding layer, geocomposite, flexible membrane liner and cover for approximately 80 acres. The north cover work was about 70% complete at the time of the review. The team had no outstanding issues with the quality of the work and made mention of the good job of controlling surface water runoff during construction.

Water Treatment Plant

The WTP has been fully built and is waiting on startup. The team had no concerns with the WTP.

Retention Basin
The basin in 95% complete, with minor grading left to be completed. The team had no other concerns.

Overall, the team felt that the remedy was already performing as expected, even though the construction is not complete. The installation of the sheet pile wall and slurry wall have had a positive effect of lowering the discharge of contaminated water to Mud Gully as evidence by the monthly surface water samples collected in the gully. The construction of the cover system over both Brio North and South had also had a positive effect of lowering air emissions from the site. In fact, since construction has started, no exceedances of the fenceline standards have been recorded on the air monitoring stations.

Document Review
The team reviewed the latest reports on the groundwater and surface water for the Brio site. The team concluded that for surface water the barrier wall is operating as designed and the data shows that the performance standards for VOCs are being met in the receiving stream.

The review of the groundwater data showed that the data from the fifty-foot sand is probably meeting the performance standard. An issue of whether the analytical method being used is the appropriate method was discussed because the detection limit of 10 ppb does not achieve the MCL for vinyl chloride (2 ppb), 112 TCA (5 ppb), or 12 DCA (5 ppb). Language in the statement of work to the consent decree allows for a higher performance standard if that is what EPA approved methods achieve.

An additional concern was noted for the number of wells completed in the fifty foot sand. The consent decree requires of 5 well network. Currently, only 4 wells exist due to the closure of well 13B.